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## Four New Species of *Megathymus* (Lepidoptera, Rhopalocera, Megathymidae)

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When I started work on *Megathymus* I was of the opinion that it was a rather small genus, composed of about 12 or 13 species, with a number of geographical subspecies. Now, after several years, I have reached the conclusion that this is a very large and complex genus in many ways. Distributional study and life history work are proving that several of the supposed subspecies present are actually separate species. The term "subspecies" cannot be applied because a number occur in the same area or very close together. The distinctive factor for each species appears to be the food plant of the larvae, as each species of *Agave* feeder feeds on a different species of *Agave*. This was brought forward when I first discovered *Megathymus chisosensis* Freeman and again last year when I discovered *Megathymus mcalpinei*, new species. Actually, only a few miles separate these two, but they were discovered on separate species of *Agave*. In the area where *chisosensis* was found, four species of *Agave* grow, but the larvae were found in only one distinctive species of that genus. In the area where *mcalpinei* was found, three species of *Agave* grow, but the larvae were always found in only one species of plant. This not only applies to the *Agave* feeders but to the *Yucca* feeders as well, as is shown by the discovery of *Megathymus harrisi*, new species, feeding in *Yucca filamentosa* Linnaeus in northern Georgia and *Megathymus cofaqui* (Strecker) feeding on *Yucca aloifolia* Linnaeus in Florida and eventually in the southeastern part of Georgia. Considerable work is

needed both here and in Mexico before we can say how many species of *Megathymus* actually exist.

In this article I present the descriptions of four new species of *Megathymus*, two from Texas, one from Georgia, and the fourth from a specimen originally contained in the C. C. Hoffmann collection from Mexico, now a part of the American Museum of Natural History collection.

*Megathymus harrisi*, new species

Figures 3, 4, 7, 8, 27, 28

MALE (UPPER SIDE): Primaries black, with some golden yellow hairs and scales near the base; cell spot 1.7 mm. wide at top, becoming broader at bottom (3.2 mm.), sordid white across top, remaining portion bright yellow; three subapical spots very light yellow; two elongated extradiscal spots lie outside subapical and discal spots; discal band composed of three spots, the one in interspace 1 an irregularly shaped spot straight on its outer edge and tapering inward at bottom on inner side, 2.5 mm. wide, the one in interspace 2 broadly rectangular, 6 mm. wide, the one in interspace 3 of the same width and extending inward to bottom of inner side of cell spot. Discal spots of same bright yellow color as lower part of cell spot. Fringes alternately black and light gray.

Secondaries black, with some golden yellow hairs and scales extending from near anal angle to base; some long black hairs (5 mm.) standing upright over upper part of basal and discal areas; a broad, light yellow marginal border (3–3.5 mm. wide); an indistinct yellow spot near marginal border between  $M_2$  and  $M_3$ ; veins  $M_3$ ,  $Cu_1$ ,  $Cu_2$ , and  $2d$  A are dark in the marginal border and terminate in a black spot in the fringe. Fringes creamy white except at the vein endings which are black.

MALE (UNDER SIDE): Primaries black, with apical angle heavily overscaled with gray scales. All spots except extradiscal ones reappear and are lighter in coloration. Veins lighter than ground color, giving the wings a slightly streaked appearance.

Secondaries have the ground color black, heavily overscaled with dark gray scales except along the costal area. An indistinct discal band composed of two small creamy spots, encircled with black, and two black bars. One male has a minute white spot below the costal area.

Thorax above dark gray, with some golden yellow hairs concentrated from near the anterior portion about two-thirds of the way to the posterior part, beneath black. Abdomen above dark gray, with some golden yellow hairs present, beneath somewhat lighter. Palpi sordid white. Legs

brownish black. Antennae white, circled with black rings, except the club which is white with the tip black.

Expanse, 54 to 60 mm.; average, 59 mm.

FEMALE (UPPER SIDE): Black with a few golden brown hairs near base; cell spot somewhat square, 3.5 mm. wide, and actually composed of two fused linear spots, the upper one being lighter than the lower which is orange in color; three subapical spots, the top one yellow and the bottom two orange; two linear extradiscal spots orange; discal band composed of three spots, the one in interspace 1 narrower than tall and 3.5 mm. wide, the one in interspace 2 broad, 6 mm. wide at bottom and 8 mm. wide at top, the spot in interspace 3 9 mm. wide and extending to inner side of cell spot. All these spots are orange in color. A minute orange spot midway between base and discal spot in interspace 1. Fringes alternately checkered black and gray.

Secondaries black, with some golden brown hairs over the basal area. A slightly curved discal band composed of five small orange spots. A few orange scales along the margin just inside the fringes. Fringes creamy yellow, with a slight indication of gray at the vein endings.

FEMALE (UNDER SIDE): Primaries black, with some grayish overscaling near the apical angle. All spots reappear and are about the same color.

Secondaries black, heavily overscaled with dark gray. A single small creamy spot below the costal area. Discal band present only as two small creamy spots near the anal angle and a very faint darker line.

Thorax above dark gray, heavily clothed with golden brown hairs, beneath gray. Abdomen of same general color as thorax. Legs gray. Palpi sordid white. Antennae as in the males except the black rings are broader and there is more black over the tip of the club.

Expanse, 58 to 60 mm.; average, 59 mm.

TYPE MATERIAL: Holotype male, Stone Mountain, Georgia, July 17, 1953 (Lucien Harris, Jr.); allotype female, Stone Mountain, Georgia, July 19, 1953 (Lucien Harris, Jr.). Paratypes: Five males and three females collected during July, 1950, 1952, and 1953, at Stone Mountain, Georgia, by Lucien Harris, Jr., and Lucien Harris, III, and one female, Cleveland, Georgia, July 30, 1952, collected by Lucien Harris, Jr. The holotype and one female paratype are in the American Museum of Natural History; the allotype and one male paratype are in the collection of the author; a pair of paratypes are in the Chicago Natural History Museum, a pair of paratypes are in the Stallings and Turner collection, and there are two male and one female paratypes in the collection of Lucien Harris, Jr.

This species is named for my friend Lucien Harris, Jr., Avondale Estates, Georgia, who so carefully worked out its life history.

When I first examined a pair of this new species I was of the opinion that it was a subspecies of *cofaqui* (Strecker). However, this presented a problem in that *cofaqui* was described from a female collected in Georgia by H. K. Morrison. After receiving a photograph of the type of *cofaqui* and comparing it with the pair of specimens from Stone Mountain and then with specimens from Florida I decided that the Florida specimens were the same as the type and that the pair from Georgia represented something different. When the life histories of both were worked out by Harris (with assistance by Mr. H. L. King of Sarasota, Florida, on *cofaqui*) it was found that the new species feeds only on *Yucca filamentosa* Linnaeus and *cofaqui* on *Yucca aloifolia* Linnaeus. *Yucca filamentosa* is an inland species that occurs rather commonly in the Stone Mountain area of Georgia, whereas *Yucca aloifolia* is a coastal, sand-dune species which occurs in eastern Georgia, as well as in Florida. Apparently Morrison caught the type of *cofaqui* somewhere along the eastern, coastal part of Georgia. The fact that *cofaqui* is an early spring species, reaching its best development during March, and *harrisi* is a summer species, being more abundant during July, gives evidence of their being separate species. The final evidence was discovered when the genitalia of both sexes of both species were examined. Specific differences can be noted in the shorter and broader clasper of *cofaqui* as compared with the more slender and longer structure in *harrisi*. The main difference is noted in the female vaginal plate of both species. I am gradually turning more to the use of the female genitalia as a specific means of determination in *Megathymus*, as less variation seems to be present than is found in the males. (See figs. 25–28.) Basically the vaginal plate of *harrisi* shows closer relationship to that of *texanus* Barnes and McDunnough and of *streckeri* (Skinner) than it does to that of *cofaqui*. *Texanus* and *streckeri* show the same broad effect, with elongated anterior flanges. However, they are actually very different. *Cofaqui* has the vaginal plate more slender and elongated with much shorter anterior flanges.

Superficially there are marked differences between *harrisi* and *cofaqui* (figs. 1–8). *Harrisi* is a larger species, averaging 59 mm. in wing expanse, whereas *cofaqui* averages 55 mm. or less. The type of *cofaqui* is 56.5 mm. The ground color of *harrisi* is black, with the spots more lemon-yellow in the males than orange-yellow, while the ground color of *cofaqui* is brown, with the spots more orange-yellow. In the females the discal band of spots on the upper side of the secondaries in *cofaqui* has a tendency to run together to form a continuous band, whereas these same spots in



*harrisi* are reduced and separate. On the lower surface of the secondaries the light spots present in *cofaqui* are greatly reduced in *harrisi*, giving the general appearance a more uniformly even, dark coloration. The antennae of *harrisi* have more white than in *cofaqui*, and the palpi are lighter in color than those of *cofaqui*.

*Megathymus belli*, new species

Figures 9, 10, 29

MALE (UPPER SIDE): Primaries warm brown, base of wings slightly rust; an oval-shaped spot near the end of and extending across the cell; three subapical spots narrow but elongated, 2 mm. wide; two extradiscal spots separated from the subapical and discal spots, 1.5 mm. wide; discal band composed of three spots, the one in interspace 1 2.5 mm. wide and tapering inward on the inner side, the one in interspace 2 wider (4 mm.) and rounded on its inner side, the one in interspace 3 slightly pointed towards the cell spot and 3 mm. wide. All these spots are orange in color. Fringes are rubbed off.

Secondaries warm brown, with some rust hairs near base; a slightly angled discal band of six separated spots, which vary from mere dots near apical angle to 2.5 mm. near anal angle, extends across the wing; all spots deep orange in color. Fringes alternately checkered brown and white.

MALE (UNDER SIDE): Primaries brownish black, slightly lighter near the apex. All spots reappear and are lighter in coloration.

Secondaries have the ground color brownish black, rather evenly overscaled with gray. A sordid white spot below the costal margin. The discal band reappears as an indistinct gray area.

Thorax above brown, beneath brownish gray. Abdomen above brown, lighter beneath. Legs brownish gray. Antennae and palpi missing.

EXPANSE: Primaries: base to apex, 26.5 mm.; apex to outer angle, 16 mm.; outer angle to base, 20 mm. Secondaries: from base to center of outer margin, 21 mm. Over-all expanse of primaries: 53 mm.

TYPE MATERIAL: Holotype male, La Bequilla, Durango, Mexico, July 29, 1902 (Batty), in the American Museum of Natural History.

This species was found by Mr. E. L. Bell and Mr. Cyril F. dos Passos among the other specimens of *Megathymus* in the American Museum collection. It gives me great pleasure to name it for Mr. Bell because of the many ways in which he has helped me with the Hesperioidea.

This specimen is very badly worn, indicating that the collector caught it by grabbing it by the wings. Even in its worn condition it reveals dis-

tinguishing characteristics. In general appearances it resembles *Megathymus evansi* Freeman (figs. 11–14) more than any other described species in this genus. On the primaries *belli* lacks the elongated orange spot near the base of the wings which is found in *evansi*, and the ground color is a much warmer brown. The same holds true for the ground color of the secondaries, and the discal band is composed of smaller spots. On the lower surface there are not so many contrasting gray and dark areas in the vicinity of the discal band on the secondaries.

The form of the genitalia places this species in a group by itself. The fact that the uncus is not bifid easily separates this species from the other members of the genus, and there are other differences, as can be noted in the figure (fig. 29).

*Megathymus mcalpinei*, new species

Figures 15–18, 30, 31

MALE (UPPER SIDE): Primaries black, extending over all the basal part of the wing from the costal area to the bottom of the discal band is a bright orange area, leaving the black ground color restricted to a small section of the wing; cell spot fuses into orange of costal area; discal band composed of three fused spots which form a straight line on their outer surface and an irregularly shaped line on their inner surface; two extradiscal and three subapical spots all fused together into discal band; width of discal spot in interspace 2 is 4.5 mm.; all spots of the same bright orange color as the base. Fringes alternately black and light; the light part is composed of both white and yellow scales.

Secondaries bright orange over the basal area to the discal band, which is composed of seven fused spots; from the discal band to the fringes the ground color is black. Fringes alternately checkered like the primaries, except that there are more of the yellow scales present in the light part.

MALE (UNDER SIDE): Primaries black, having the apical area overscaled with gray scales. All spots reappear and are slightly lighter in color. Orange area confined to lower part of wing, from below discal band to near base of wing.

Secondaries have the ground color dark gray, with two black spots on the costa and below this two rather indistinct sordid white spots. The discal band reappears only as a slightly lighter gray area.

Thorax above orange, with some brown hairs present, beneath dark gray. Abdomen above orange, with the sides and lower surface gray. Palpi sordid white. Legs gray. Antennae white above, ringed with black,

the white extends halfway on the club, the remaining portion being black.

Expanse, 53 to 56 mm. ; average, 54 mm.

FEMALE (UPPER SIDE) : Black ground color restricted to small area between subapical spots and cell spot, and from apex downward on outside of subapical, extradiscal, and discal spots ; remainder of wing bright orange, except for three small oval spots, one in interspace 1, one in interspace 2, and one in interspace 3, near middle of the wing ; the cause of the bright orange color is the enlargement and fusion of all the spots into the orange basal color. Fringes alternately checkered black and yellowish.

Secondaries bright orange, except outer margin beyond discal band, which is black. Discal band composed of seven broad, fused spots, 2 to 5 mm. in width, and between the base and the discal band it is possible to discern the dark ground color even though it is heavily overscaled with orange. Fringes alternately checkered black and yellowish orange.

FEMALE (UNDER SIDE) : Like the males except the spots on the primaries are wider and there is a tendency for the veins to become orange inward from the discal band.

Thorax, abdomen, legs, palpi, and antennae are as in the males.

Expanse, 57 to 62 mm. ; average, 60 mm.

TYPE MATERIAL : Holotype male, 5.1 miles north of Marathon, Texas, September 26, 1953 (H. A. Freeman) ; allotype female, October 5, 1953, same location and collector ; seven male and five female paratypes from the same location and by the same collector, which emerged in Garland, Texas, during September and October of 1953. The holotype and a female paratype are in the American Museum of Natural History. A pair of paratypes are in Mr. W. S. McAlpine's collection, and a pair are in the Stallings and Turner collection. The allotype and remaining paratypes are in the author's collection.

This species is named in honor of my good friend Mr. W. S. McAlpine who has helped in many ways with my work on this group of butterflies.

This species belongs in the *neumoegeni* Edwards group and appears to represent the extreme in spot development. The other two described members of this group (*neumoegeni* Edwards and *chisosensis* Freeman) show a progressive development towards *mcalpinei*, with *chisosensis* at one extreme and *neumoegeni* near the middle. In general appearance the males of *mcalpinei* somewhat resemble those of *neumoegeni*, but there are several differences. The color of the spots and heavy overscaling on *mcalpinei* is bright orange, while in *neumoegeni* it is more of a reddish orange like the color of *chisosensis*. The spots and orange color are much more extensive in *mcalpinei* than in either *neumoegeni* or *chisosensis*.

The disposition of the discal band is situated in the same area in *neumoegeni* and *mcalpinei*, whereas in *chisosensis* it is located slightly farther outward. On the lower side of the secondaries all three species show marked differences. *Neumoegeni* has the ground color uniformly very dark, while *mcalpinei* is uniformly lighter in color. *Chisosensis* has the lighter areas of the discal band differently placed, being more evenly curved inward. The female specimens of *mcalpinei* are different from those of any other known species of *Megathymus*, caused primarily from the enlargement and fusion of the spots with the bright orange basal color, giving the insect the appearance of being evenly bright orange all over. As there are only a few known females of *neumoegeni* the exact variation in coloration is not known, but of the three that I have examined none shows the characteristics of *mcalpinei*.

The male genitalia place this species in the group with the above two-mentioned species, but a distinctive character is the sharply angled lower side of the clasper at the flange. Other differences can be noted in figure 30. The vaginal plate (fig. 31) also places this species in the *neumoegeni* group, although it shows constant differences from *neumoegeni* and is not at all like *chisosensis*.

In the Southern Methodist University Herbarium about two years ago I discovered leaves and flowers of an apparently new species of *Agave* from the Glass Mountains north of Marathon, Texas. On July 31, 1953, while driving north towards the Glass Mountains, at 5.1 miles north of Marathon in the flats, I found a colony of *Agave* plants similar to those in the Herbarium, which differed from any species of *Agave* I had previously seen. The leaves were shaped like those of *Agave scabra* Lam-Dyck (which incidentally is the food plant of *Megathymus chisosensis* not *Agave chisosensis* as was previously thought owing to a botanist's misidentification), but were bright green, not the gray-green color of *scabra* leaves. The first plant examined showed old tunnels in the extreme outer leaves and oily secretions near the base of the newer inside leaves. Cutting into one leaf revealed a larva. In all, 32 leaves showing the oily secretion near the base were cut off, from which 14 adults were raised. An interesting observation was that no signs of any waste from the larvae were found, which indicates that members of this group of *Megathymus* feed not on the leaf tissue or roots as do *Yucca* feeders but on the sap in the fleshy part of the *Agave* leaf. This may explain why members of this group are not so highly parasitized with Tachinidae as are *Yucca* feeders, which expose a part of their anatomy during defecation. When the larvae were first observed it was noted that they were



different from those of *chisosensis* because of the distinctive blue-gray color, whereas the larvae of *chisosensis* are grayish ivory.

DESCRIPTION OF MATURE LARVAE: Average length, 41 mm.; transverse diameter, 10 mm. at the sixth segment.

Body rather stout as compared with that of most *Megathymus* larvae, with a rather abrupt cephalic tapering, beginning at fifth segment. Color bluish gray. Caudal segment brown. Dark brown scutellum on first segment. Legs slightly darker than body. Prolegs same color as legs. Clasper brownish. Spiracles oval, conspicuous, brown.

Head pale brown, with a very few scattered tan hairs. Surface very finely granular. Segmental lines separating lobes and clypeus somewhat darker in color than contiguous parts. Ocelli minute, light brown. Mouth parts brown, especially the mandibles which are nearly black. Head small (3.5 by 2.7 mm.) as compared with rest of body.

A few minute hairs on body, and four rows of light brown spots, four per segment.

MALE PUPAE: Length, 27–33 mm.; width, 7.2–7.9 mm.

FEMALE PUPAE: Length 34–36 mm.; width, 8.1–8.5 mm.

In general appearance the pupae of this species resemble those of *M. mariae* Barnes and Benjamin, except they are larger.

TUNNEL AND EXCAVATION: Very similar to those made by *chisosensis* except the tunnels are even shorter.

From the available information it is assumed that this species flips the eggs into the *Agave* plants during the first part of October. The eggs hatch in about two weeks and make a tiny hole near the tip of the *Agave* leaf where they surround themselves with the sap of the leaf. This observation was first made by Stallings and Turner. After entering the second or third instar they move down near the base of the leaf and make a definite tunnel, where they feed until the middle or last of August and then coat the inside of the tunnel with silk and a flaky white material which prevents the sap from entering the tunnel. They then construct the sericin-like door over the entrance and pupate. Emergence occurs in from three to four weeks.

### *Megathymus smithi* Druce

Figures 19, 20, 34

The type of *Megathymus smithi* Druce, a unique, was collected at Amula, Guerrero, Mexico, during September, 1888, by H. H. Smith and described by Druce eight years later. Since that time, as far as I can ascertain, no more specimens of *smithi* have been collected. Hoffmann re-

corded *smithi* from several localities in Mexico, but he was confused in his determination of that species and his specimens turned out to be undescribed. For a number of years another specimen of ?*smithi* has been known, which is in the William Barnes collection, now in the United States National Museum. It has been credited to Barnes' collecting. I question this, as Barnes was careful about placing the date of capture on his specimens, and this particular specimen has only Corpus Christi, Texas, on the label. On April 16, 1938, I received a letter from Dr. Eugene Murray-Aaron concerning a specimen of *smithi* that he caught in the Nueces River bottoms near Corpus Christi during 1884. After considerable effort a third specimen of ?*smithi* was found, a male in the Los Angeles County Museum bearing the following information on the labels; "East Bexar Co. Texas, II-29-33, *Agave variegata (maculosa)* food plant." This specimen helped me to discover the actual life history and location of several colonies of what was first thought to be *smithi*.

After rearing a number of specimens of this species I found that it did not correspond to the original description of *smithi* as to color, size, and maculation. Kent Wilson gave me a photograph that he made of the type. Also a photograph was received from Brigadier W. H. Evans of the British Museum, and another photograph of both surfaces was received from A. B. Klots which is used in this article. A careful examination of these photographs definitely established the fact the Texas specimens represented a new species, related to but distinct from *smithi*.

*Megathymus maculosus*, new species

Figures 21-24, 32, 33

MALE (UPPER SIDE): Primaries uniform blackish brown; a V-shaped spot located near end of cell; discal band somewhat variable, ranging from two to four spots, more typically the latter; two extradiscal spots somewhat out of line with the discal band are present; three subapical spots somewhat linear in shape; on costal margin three light areas, one between Sc-R<sub>1</sub>, one between R<sub>1</sub>-R<sub>2</sub>, and one between R<sub>2</sub>-R<sub>3</sub>; these areas and all the spots light fulvous, nearly tan. Fringes alternately brownish black and tan.

Secondaries blackish brown, basal half covered with long brownish black hairs, semi-erect; in some specimens there is the slightest indication of two faint linear spots between the discal area and the apex, otherwise immaculate; the great majority of specimens lack these spots. Fringes alternately checkered brownish black and tan.

MALE (UNDER SIDE): Primaries brownish black, lighter near outer

margin. A narrow band of gray scales runs from near center of outer margin to apex, where it merges into two grayish black areas. All spots reappear and are somewhat lighter in color.

Secondaries have the ground color black, with costa gray. An irregular discal band composed of nine grayish tan spots, more or less fused together. Two to four spots of same color near base. Between discal band and outer margin the ground color is overscaled with gray, and there is more of this same overscaling near the base. The entire surface of the wing has a beautiful mottled appearance.

Thorax above and below brownish black, with some long hairs of same color. Abdomen of same color. Palpi brownish black above, tan below. Legs brownish black. Antennae brown, and a white stripe just below the black club.

Expanse, 35 to 49 mm.; average, 42 mm.

FEMALE (UPPER SIDE): Primaries dark brown, nearly black. Maculation similar to that of males except the spots larger and somewhat darker in coloration. Fringes alternately checkered brown and fulvous.

Secondaries dark brown, with some dark brown hairs, which are not semi-erect, near the base. Some specimens are immaculate, whereas others have a well-marked discal band of from two to five fulvous spots; upper two linear, lower two or three mere dots. Fringes fulvous, with a more or less faint checkering of brown.

FEMALES (UPPER SIDE): Primaries similar to those of male except lower discal spot greatly enlarged.

Secondaries very similar to those of male.

Thorax above dark brown, with some long hairs of same color, below dark brown. Abdomen of same color. Legs brown. Antennae brown, with a white stripe just below the black club.

Expanse, 40 to 51 mm.; average, 45 mm.

TYPE MATERIAL: Holotype male, Kingsville, Texas, September 21, 1952 (H. A. Freeman); allotype female, Kingsville, Texas, September 24, 1952 (H. A. Freeman); 100 paratypes from the following localities in Texas: nine males and 19 females, Kingsville, September and October, 1952; 12 males and 12 females, Parita Creek, east Bexar County, September and October, 1951-1952; three males and two females, 10.8 miles west of Mission, September and October, 1952; one male and two females, Sinton, September and October, 1952; one male, Falls City, September 27, 1952; two females, 3.8 miles northwest of Floresville, September, 1952; one male, Sullivan City, caught April 4, 1953; five males and two females, Kingsville, April and May, 1953 (pupae collected April 5, 1953); of these 75 specimens 60 were collected in

the larval stage by H. A. Freeman and five by Louis Moore. Specimens collected by Stallings and Turner : six males and 11 females, Sinton, September, 1953; three males and two females, Falls City, September, 1953; three males and two females, Floresville, May, 1954 (larvae were collected during December, 1953). The other two paratypes are the specimens in the Los Angeles County Museum (east Bexar County, November 29, 1933) and the United States National Museum (the Barnes specimen from Corpus Christi). Holotype and allotype are in the American Museum of Natural History; two male and three female paratypes are in the collection of Otto Buchholz; one pair of paratypes are in the collection of Lowell Hulbert; 13 male and 16 female paratypes are in the Stallings and Turner collection; one pair of paratypes are in the collection of W. S. McAlpine; one female paratype is in the collection of H. L. King; one female paratype is in the collection of Lucien Harris, Jr.; one pair of paratypes are in the Los Angeles County Museum; one male paratype is in the United States National Museum; one pair of paratypes are in the collection of Cyril F. dos Passos; and the remaining paratypes are in the collection of the author.

This new species is named after the food plant of the larvae, *Manfreda maculosa* Hooker.

There are several marked differences between *maculosus* and the type of *smithi*: (1) The type is  $2\frac{1}{2}$  inches (64 mm.) in expanse, whereas the males of *maculosus* average 42 mm.; (2) the type was described as dark brown in color, whereas the new species is blackish brown; (3) the type of *smithi* has a discal band on the upper surface of the secondaries, composed of five yellowish spots, while this band is lacking in the males of *maculosus*; and (4) there are differences in the genitalia as can be seen in figures 32 and 34.

After checking the data on the labels of the Los Angeles County Museum specimen I asked Dr. Lloyd Shinnars of the Southern Methodist University Herbarium to examine the taxonomy of *Manfreda variegata* (Jacobi) Rose and *maculosa* Hooker. He found that *maculosa* is the correct name for the plant that grows in south Texas. During November, 1949, I discovered a colony of *maculosa* growing near Parita Creek, east of San Antonio, but was unable to locate signs of the larvae because I did not know its habits. During August, 1951, I observed some *maculosa* plants growing within the city limits of Bracketville, Texas, and on examining these plants I found an old tent in the center of one of them, resembling the same type of structure erected by *Megathymus yuccae* (Boisduval and LeConte) in *Yucca* plants. Inside the old tent was the remains of a pupal skin. Louis Moore and I went to Parita



Creek and after carefully working for several hours I found 13 larvae and Moore found five. These I dug up and carried home and from the 18 larvae, eight males and four females finally emerged. On August 16, 1952, I found 11 larvae near Parita Creek and on the following day I found 15 more at the same place. On August 18, 1952, I found five larvae, 10.8 miles west of Mission. On the following day I found 39 larvae just south of Kingsville and on the same day five were found 1 mile south of Sinton, two near the railroad station at Falls City, and three, 3.8 miles northwest of Floresville. The total number of larvae found during 1952 was 77, from which 53 adults emerged. This indicated that *maculosus* is fairly common over most of south and southeastern Texas, wherever *Manfreda maculosa* grows. It is interesting to note that *Manfreda maculosa* does not occur in the area from which the type of *smithi* came, although *Manfreda maculata* (Martius) Rose grows in that general area, and it is likely that *smithi* feeds during the larval stage on that species of plant.

While collecting near Sullivan City, Texas, April 4, 1953, I caught a male specimen of *maculosus*. This confused me as I had previously thought that all the species of *Megathymus* were single brooded. On April 5, I stopped at Kingsville to examine the colony there and found a few tents in perfectly green *maculosa* plants. On examination of these tents it was found that all but one were in the pupal stage, thus definitely proving that *maculosus* is double brooded, the entire life cycle lasting only six months instead of the usual 12 months as with the other known *Megathymus*.

LIFE HISTORY: Egg hemispherical, base flat and slightly cupped in center. Sides rounded. Color yellowish green when first laid. After the second day it becomes darker green. Size: 1.85 mm. in diameter, 1.10 mm. high. Micropyle rather inconspicuous at apex. Texture of entire egg very finely granular.

LARVAE (FIRST INSTAR): Length extended, 6 mm. Color reddish brown. Legs concolorous with body. Spiracles tan. Head brown, with some blackish brown hairs. Entire body covered rather sparsely with brownish hairs.

MATURE LARVAE: Of the 15 specimens measured, the average length was 37 mm.; the smallest was 21 mm., and the largest 41 mm. (The 21-mm. larva was from a small plant, and the larva had completely devoured the fleshy portion of the root and only a thin wall remained. This larva died just before pupation.) The average transverse diameter was 4.8 mm. at the sixth segment. Body rather slender, as compared with larvae of other *Megathymus*. There is a gradual cephalic tapering from the

sixth segment, and the caudal tapering is also gradual. Color ivory, with only the faintest suggestion of light brown near the head and caudal segment. There is a rather inconspicuous, brown scutellum on the first segment. Legs concolorous with body. Prolegs as well as claspers same color as body. Spiracles very inconspicuous, brown in color. Head pale tan, only slightly darker than body, sparingly covered with short yellowish hairs. The segmental lines separating clypeus and lobes are only slightly lighter in coloration than the surrounding area. Ocelli very small, brown. Mouth parts light brown. Average head measurement is 2.35 mm. from side to side.

The entire body of the larva is covered with minute tan hairs, which are barely discernible because of the flaky white powder that is present soon after the larva reaches maturity.

PUPAE: On September 16, 1951, a larva crawled out of the chamber at 11:30 A.M. and formed a pupa at 1:00 P.M. Color when formed was yellow. Length at 5:00 P.M. of the same day was 26 mm.; diameter, 6 mm. Another pupated the same day. Of the 45 pupae carefully examined the average length was 25 mm. and the diameter 5.5 mm. The pupae of this species show considerable resemblance to those of *Megathymus yuccae* (Boisduval and LeConte) and its subspecies. The caudal process is spade-shaped instead of pointed as in the *Agave* feeders. This is the process by which the pupa moves up and down in its chamber.

FOOD PLANT AND METHOD FEEDING: Apparently the eggs are deposited on or near the *Manfreda maculosa* Hooker plants. Upon emergence from the egg the larvae bore into the center of the plant, which is composed of the soft new leaves, and gradually work their way into the root. As the larva hollows out the root it places a silken material all over the excavated area, thus preventing plant juices from ruining the tunnel. As the larvae feed they continue to molt and will shed their skin five times. Each day the larvae come to the top of the plant for defecation. They stick the caudal portion out (last four or five segments), defecate, go down into the tunnel, turn around, then return to the opening, and seal up the entrance in much the same way as larvae of *Megathymus yuccae* do. As they continue to do this a tiny tent-like structure completely covered with droppings can be easily detected in the very center of the *Manfreda* plant. As the larvae reach their last molt the plant is virtually dead, with withered leaves and the small brown tent-like opening to the excavation all that remain. Many larvae are found in restricted areas, especially beneath cacti, thus making it difficult to dig them up. The fall brood hatches during September and October, and the spring brood hatches during May and, rarely, during the last of April.

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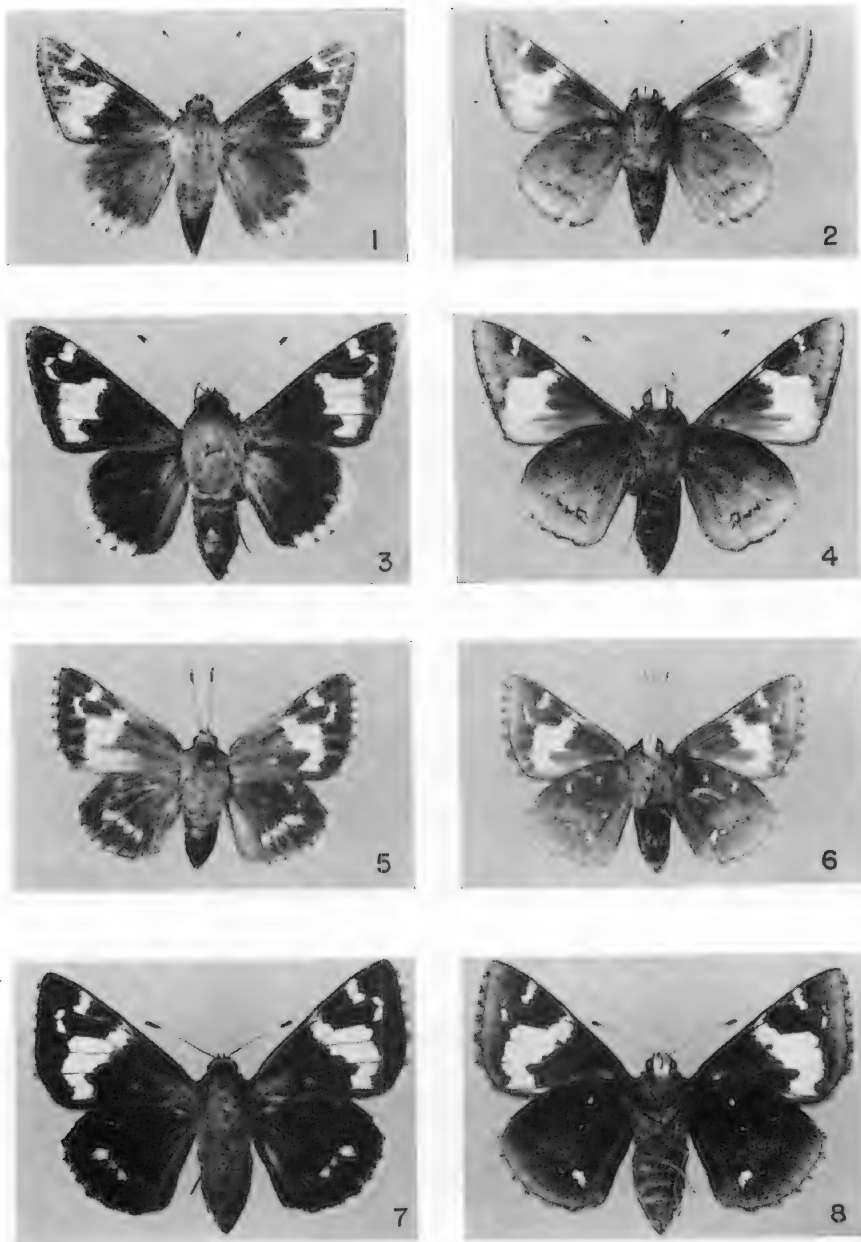
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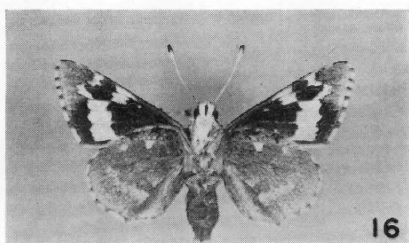
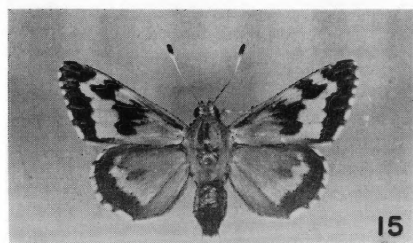
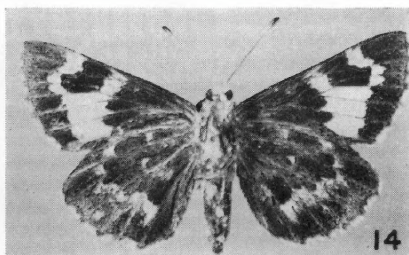
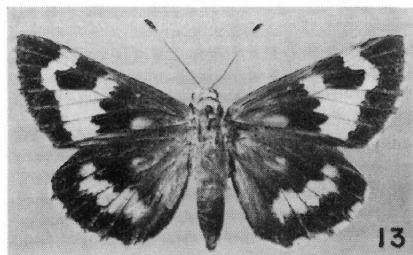
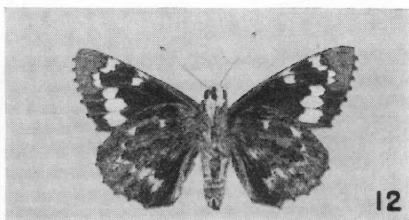
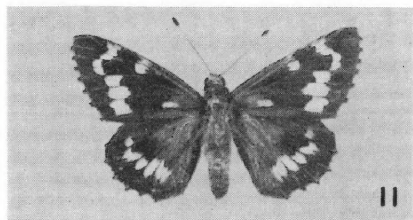
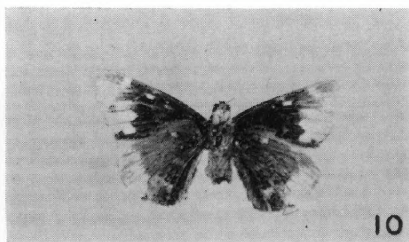
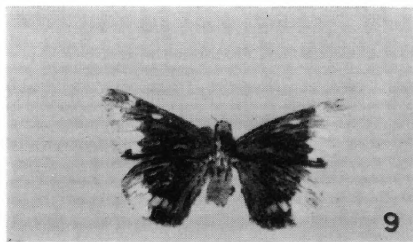
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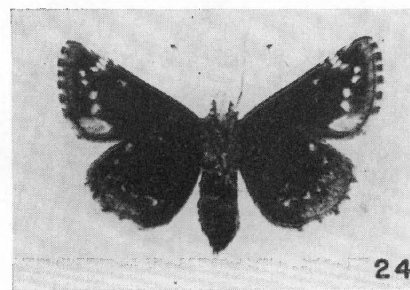
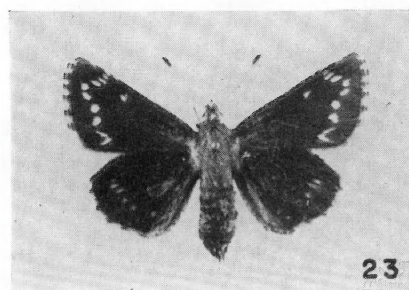
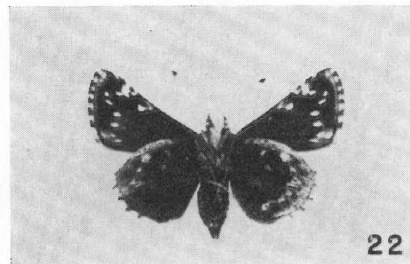
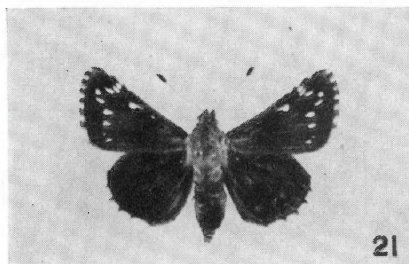
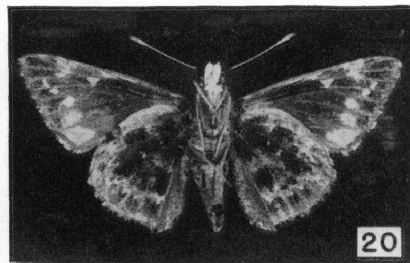
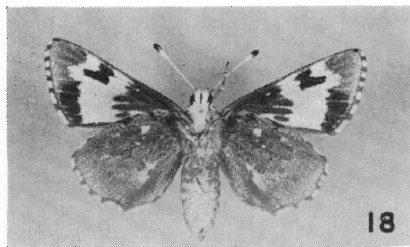
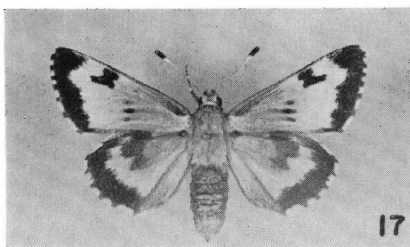


FIGS. 1-8. Adults, upper and under surfaces. 1, 2. *Megathymus cofaqui* (Strecker), male. 3, 4. *M. harrisi* Freeman, holotype male. 5, 6. *M. cofaqui* (Strecker), female. 7, 8. *M. harrisi* Freeman, allotype female.

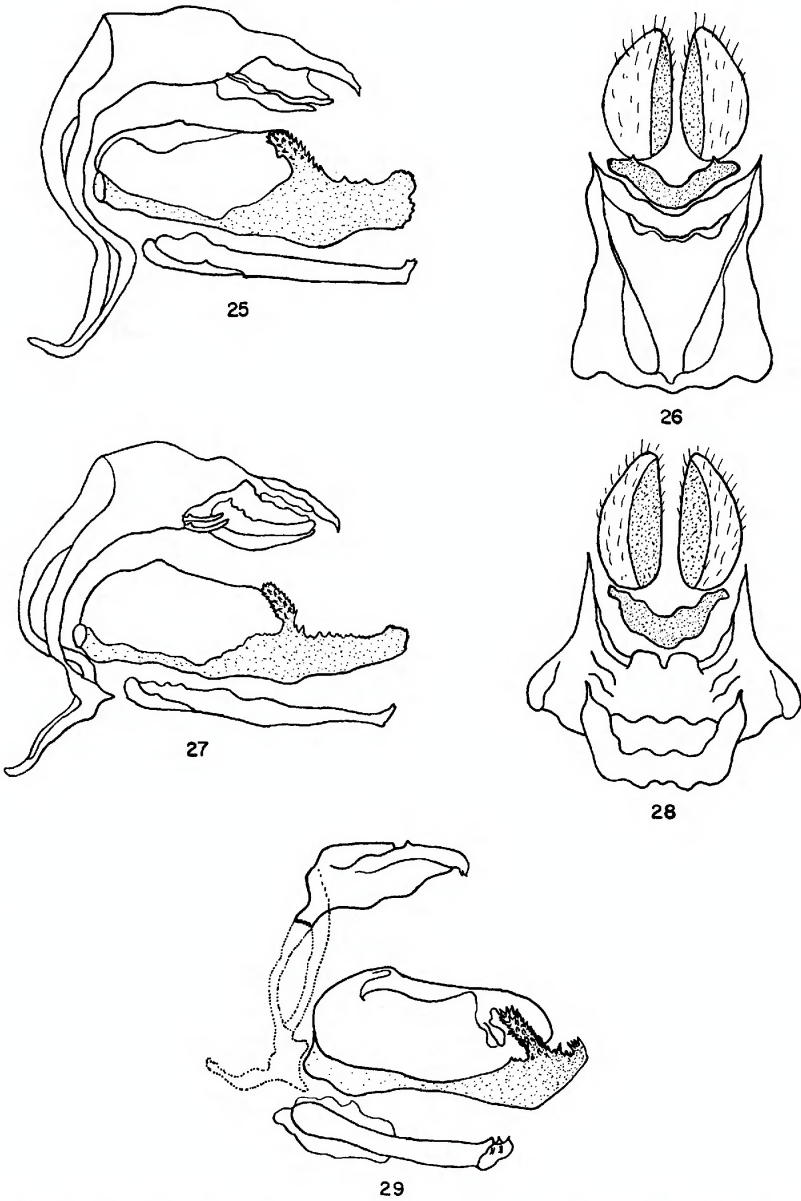




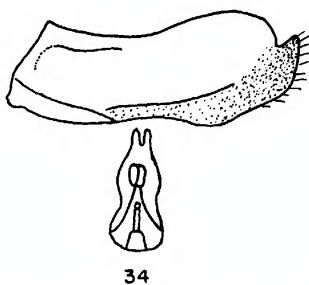
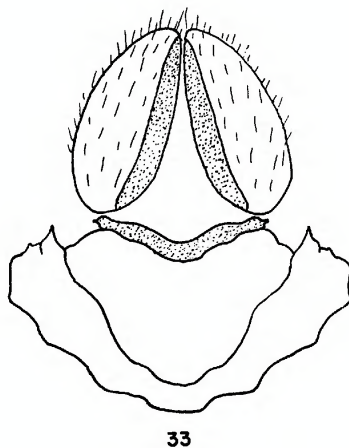
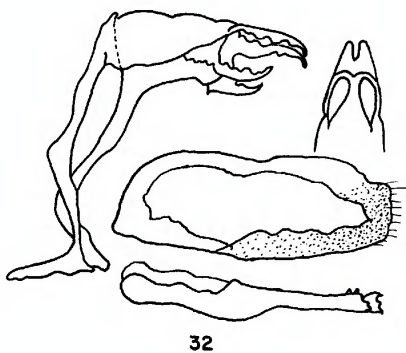
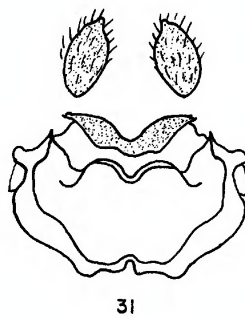
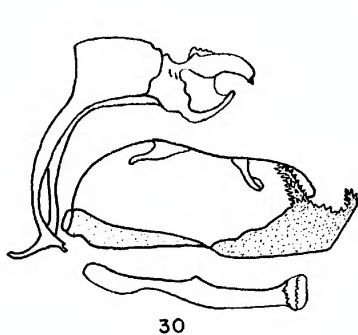
FIGS. 9-16. Adults, upper and under surfaces. 9, 10. *Megathymus belli* Freeman, holotype male. 11, 12. *M. evansi* Freeman, holotype male. 13, 14. *M. evansi* Freeman, allotype female. 15, 16. *M. mc Alpinei* Freeman, holotype male.



FIGS. 17-24. Adults, upper and under surfaces. 17, 18. *Megathymus mcalpinei* Freeman, allotype female. 19, 20. *M. smithi* Druce, holotype male. 21, 22. *M. maculosus* Freeman, holotype male. 23, 24. *M. maculosus* Freeman, allotype female.



FIGS. 25-29. Male and female genitalia. 25. *Megathymus cofaqui* (Strecker), male genitalia. 26. *M. cofaqui* (Strecker), female vaginal plate. 27. *M. harrisi* Freeman, male genitalia. 28. *M. harrisi* Freeman, female vaginal plate. 29. *M. belli* Freeman, male genitalia.



FIGS. 30-34. Male and female genitalia. 30. *Megathymus mcalpinei* Freeman, male genitalia. 31. *M. mcalpinei* Freeman, female vaginal plate. 32. *M. maculosus* Freeman, male genitalia. 33. *M. maculosus* Freeman, female vaginal plate. 34. *M. smithi* Druce, male genitalia.